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THIRTY-EIGHTH ANNUAL REPORT

OF THE

SOUTH CAROLINA

STATE BOARD OF FISHERIES

YEAR ENDING JUNE 30, 1944

TO THE

GOVERNOR AND
GENERAL ASSEMBLY



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JOINT COMMITTEE ON PRINTING
GENERAL ASSEMBLY OF SOUTH CAROLINA

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GENERAL ASSEMBLY OF SOUTH CAROLINA

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J. M. Witsell, Chairman	Walterboro, S. C.
J. F. Morrall	Beaufort, S. C.
W. Kenneth Suggs	Conway, S. C.
J. Shepherd Thompson	Georgetown, S. C.
D. H. Gadsden, Secretary	Charleston, S. C.

Offices: 93 Broad Street, Charleston, S. C.

INSPECTORS

Chief Inspector: Alonzo B. Seabrook, North Charleston, S. C.

District No. 1.	J. Geo. Bailey	Ridgeland, S. C.
District No. 2.	J. C. Nettles	Walterboro, S. C.
District No. 3.	E. M. Bailey	Edisto Island, S. C.
District No. 4.	J. F. Bellune	Georgetown, S. C.
District No. 5.	Julian Bellamy	Little River, S. C.
District No. 6.	G. W. Harris	Ridgeland, S. C.
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District No. 8.	S. J. Thomas	Yemassee, S. C.
District No. 9.	W. L. Harbeson	Harleyville, S. C.
District No. 10.	D. M. Evans	New Zion, S. C.

REPORT

To His Excellency the Governor and General Assembly:

The South Carolina General Assembly by an Act of the Legislature created the State Board of Fisheries on February 23rd, 1906, comprising the five coastal counties; Charleston, Horry, Georgetown, Beaufort and Colleton. The personnel consisted of a Chairman, two members of the Board, Chief Inspector and five District Inspectors, placing under the Board the supervision of all commercial, salt and tidal fishing along the South Carolina Coast from the Savannah River on the South to the North Carolina Line on the North.

Under the supervision of this Board may be enumerated the catching of all migratory fish such as shad, sturgeon etc. All shell fishing for commercial purposes such as oysters, clams, and all immobile fish having shells.

The commercial fishing has increased enormously in the past several years and the personnel of the Board today consists of a Chairman, four members of the Board, a Chief Inspector, a Secretary and ten District Inspectors. The commercial fishing industry gives employment to thousands of people and in normal times is very essential for the benefit of labor.

The Board in the past few years, by the cultivation of oyster bottoms, has developed an oyster that is second to none in size and is noted for its flavor.

The Board of Fisheries through its inspectors has the South Carolina waters patrolled and sees that the laws pertaining to shellfish and migratory fish in South Carolina are enforced to the best of its ability.

The oyster, clam and shrimp industry furnish the largest amount of employment to the laborers, and also furnishes most delicious seafoods to our natives and, too, brings into the State large sums of money produced by the shipping of fresh and canned seafoods to the various markets of America and foreign countries, and leaves a large amount of money in South Carolina in the hands of the people employed. Also, the cost of upkeep of boats, and the purchase of gasoline, food and motor equipment puts in circulation considerable sums of money within the State.

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The Board has a triple function, in so far as all of its activities are concerned. The first is to conserve and develop our seafood products. The second, to see that the revenue is collected from the activities of commercial fishing as stipulated by law and the third to see that the commercial fishing laws are enforced so as to protect and conserve the natural resources of our State.

The Board of Fisheries has printed each year a book of laws pertaining to shellfish and migratory fish, a copy of which is mailed to all fishermen and operators desiring same, free of cost. This keeps the operators and fishermen fully advised as to the laws and, consequently, there should be no excuse for a violator to claim ignorance.

The Chairman of the Board of Fisheries is at his office in Charleston, S. C. on Wednesday and Thursday of each week supervising and directing the workings of the department, answering correspondence, checking the inspectors' daily reports, keeping in touch with the chief inspector and district inspectors and on many occasions making inspection trips over the coastal area to confer and make suggestions to the operators and fishermen.

We could be placed among the large operators in America if we had sufficient funds for the reclaiming of hundreds of acres of oyster bottoms. If this was done, in the course of years, it would pay back to the State many times the money spent for such rehabilitation and in times of depression would furnish work to a larger number of people and produce a larger quantity of food for the natives who in times of depression are in dire need of same. At present there is an enormous demand for shellfish and seafoods and these are also commanding very high prices.

The operators have done all in their power to produce all the seafood possible and have made the compensation very attractive to such labor as was available. Our operators have had an extremely difficult time to function on a capacity basis on account of the wide shortage of labor.

Our government has called for large quantities of shellfish and fish for the Armed Forces of America and our allies in Europe.

The State Board of Fisheries, through its Chairman J. M. Witsell, who is also Chairman of the South Carolina Branch of the Atlantic States Marine Fisheries Commission, and who with Sen-

ator J. D. Parler and Chas. J. Geilfuss are members of the Marine Fisheries Commission of South Carolina, have been doing all within their power to have uniform laws passed by the adjoining states which they feel in many instances would be very beneficial to the fishing interests of these states. Officers of the Marine Fisheries Commission have attended many meetings of the Atlantic States Marine Fisheries Commission and they feel that something has been accomplished along this line.

The General Assembly, at its last session, increased the number on the State Board of Fisheries from two to four, stipulating that a member be appointed from Charleston County and one from Georgetown County in addition to the two members already on the Board. We feel that this will be of great assistance to the Board in the way of enforcing the laws and also in conserving our resources.

We have now operating in South Carolina, one large crab canning factory, seven fresh crab meat plants, twenty raw oyster shucking plants, three oyster canning factories, five terrapin pens, twenty-two shrimp buyers and shippers, two sturgeon buyers and shippers and eleven shad buyers and shippers. This will give you an idea as to the large amount of seafoods produced and processed within the State.

This department holds its regular monthly meeting on the second Thursday of each month, at which time, usually, most of the members are present. At this time the Board pays all bills and holds public hearings on any matters that may come up. The Chairman of the Board takes up with the Board all matters of importance that have transpired since the last meeting of the Board. Applications for the leasing of oyster bottoms are taken up at these meetings for a decision as to whether the leases should be granted or not.

This department tries in every way possible to cooperate with the people engaged in the seafood business so as to assist them in conducting their business on a profitable and business-like basis. Due care is taken that the favors granted these operators do not interfere with the chief purpose and ultimate object of this department. We exert every effort possible to amicably settle disputes between parties engaged in the industry, and particularly in cases where two or more parties have been desirous of leasing the same oyster beds. In these cases the Board exerts every ef-

fort possible to locate other suitable oyster beds or bottoms so that both applicants may be satisfied, and, in this connection, would say that we have been successful. We find that these efforts on the part of the Board to assist the people engaged in the industry have engendered a spirit of cooperation and goodwill toward the Board, and we find that it has had the beneficial effect of building up the fish business in our State.

SUBJECT NUMBER ONE

OYSTERS

Relative to the distribution of oysters for this year we have experienced a heavy government buying of shucked oysters and a definite sellers' market in which, so far as we know, everywhere the demand has greatly exceeded the supply. The result has been a market in which, in many instances, abnormally high prices were secured. Shippers who held their prices in reasonable bounds are certainly to be congratulated. We can not urge too strongly a policy which makes available to the government and to civilians the best oysters that can be produced at fair prices commensurate with production cost. The oyster industry should by this time be geared to a war economy designed to render the greatest possible service to the nation under existing circumstances.

The South Carolina oysterman has been greatly handicapped by the inability to obtain a sufficient amount of labor, especially skilled labor, on account the large number of men drafted by the selective service department for the different branches of our war forces, and, too, by the prices paid to labor in the surrounding territory, which, in many cases, were prohibitive for the oyster operators to meet. Therefore, the production of oysters was cut to a certain extent.

The bottoms in South Carolina contain more oysters and of a better size than they have for many years. I feel that the oyster producers should be commended for their untiring efforts which made possible the amount of oysters they produced for market.

In view of the healthful and dietetic value of oysters, naturally, the use of same has been greatly encouraged. Frankly, it has been my personal experience that more compliments have been received on oysters from the various military and naval installations than on any other single water food item. Not only do oysters seem to be relished by the men but by the cooks as well.

There is no K. P. work to be done in preparing oysters—they are ready for cooking when received and are easily adaptable for service at large messes.

As we approach the post war transition, the need for strong trade associations becomes greater than ever. Many new problems incident to reconversion to peacetime production, price restrictions, personal relations etc., make it necessary that new legislation affecting the oyster industry be trebled. These trade associations that can speak for united industry would be bound to exercise important influence on the decisions and policies that will be adopted.

The amount of oysters gathered this year is 321,045 bushels. The amount of raw oysters in gallons is 36,391. The amount of oysters canned this year is 8,003,099 oz.

The number of acres of oyster lands leased at this date in South Carolina is 4,756.94 acres.

One of the most serious problems, on the Atlantic and Gulf coast, facing the oysterers is to secure a good set. Oyster shell used for clutch should be planted at a time when the greatest abundance of oyster larvae is in the water, and the planting should be made on the bottoms suitable for oyster culture, but in South Carolina the situation is exactly the reverse. The problem is one of too much setting rather than too little. The setting is almost entirely confined to the inter-tidal area. The set below low water mark being largely destroyed within a few weeks after detachment. The planting of shell on inter-tidal banks may be done at anytime from December through July which will assure a heavy setting.

Before describing the actual shell planting, it is necessary to point out certain peculiarities of this area. First, the average range of the tide is in excess of seven feet, so that the water level is constantly changing at the rate of about a quarter of an inch a minute. Second, there are very large areas of soft mud, thickly covered with marsh grass, the surface of the marsh itself, normally, being under water at high tide. The marshes are intersected by an extensive net work of small creeks and drains. The latter mostly dry at low water.

The planting area is the sloping mud banks along the creeks and drains, and for the best results this is limited to the space between low water mark and two and one-half feet above low water

mark. Legally, South Carolina State laws define the oyster growing area for leasing purposes as from one foot below low water mark to high water mark. Since some banks are steep while others slope gently to the water, the official oyster growing area may be as little as ten feet wide or as much as several hundred feet wide. On this account measurement of leases in acres is very difficult.

Because of the rapid rise and fall of the tide and the strong currents, large quantities of organic mud are continuously swept into suspension so that the water is usually rather turbid, the ordinary limit of visibility not exceeding four feet. There is, of course, heavy setting on the slack side of the streams, rendering them unfit for oyster culture, as the shell or live oysters are completely covered over in the space of a few weeks.

The South Carolina laws on conservation provide that up to one-third of the oyster shell taken by the canneries or shucking plants must be planted under the directions of the Board of Fisheries. Also, the law provides that the lessees of bottoms for the planting and propagation of oysters are required to plant and distribute on the leased bottoms not less than 250 nor more than 1,000 bushels of shell or seed oysters during the first year and such additional planting each year thereafter not exceeding 1,000 bushels of shell or seed oysters as the Board may require. This section is construed by the Board of Fisheries as per acre.

The Board determines where and when, and in what quantities these shall be planted. These shell are planted under the supervision of the inspectors of the Board of Fisheries and the planting is usually carried out during the months of May, June and a part of July. The planting is done from oyster schooners and barges on which the shell is generally loaded by machinery.

To utilize the service of the inspector to the best advantage for the supervising of the planting of these shells, it is usual for a number of boats to plant a specific area simultaneously so that the motor tow boats may frequently tow from six to eight loaded schooners and barges to the selected creeks. As the flats and banks are partially uncovered and, therefore, inaccessible at less than half tide, the planting is done on the last half of high tide and the first half of the ebb. The shell is shoveled overboard by the crew as the vessels move slowly over the planting area. Places that are too shallow to be reached by the larger vessels are planted from oyster bateaux which carry from 20 to 40 bushels.

of shell. The method of planting results in some unavoidable loss of shell as the exact location of the banks can not be observed, and some of them may fall either into the deep water or too high on the bank. Also it is difficult to spread them evenly, therefore, the shells must be put over the sides rather than from the sterns of the vessels.

Setting begins near the end of May and continues through August. There is some setting as early as April and as late as November, but it is not of commercial importance. The June set is most valuable as it has the advantage of a long growing season and will average two inches in length.

The following recipe of oyster chowder will, no doubt, be of interest to many house-wives as it is a delicious dish.

2 slices diced fat bacon, 2 chopped onions, 2 stalks finely minced celery, 2 cups diced potatoes, 1 teaspoon salt, 1/4 teaspoon pepper,, boiling water, 1 pint milk, 1 pint light cream, 2 tablespoons margarine, 1 tablespoon flour, 1 pint oysters.

Fry out bacon, remove bits from pan and reserve. Add onions, celery, potatoes and seasonings. Cover with boiling water, cook until potatoes are just tender. Turn into casserole, add milk and cream, heat to boiling, then thicken with blended flour and margarine. Add oysters and cook until edges curl or oysters are puffed up fat. Serves 4-6.

SUBJECT NUMBER TWO

CULTIVATING AND LEASING OYSTER BOTTOMS

Having cited you in subject Number 1 many matters relative to leasing and cultivating oyster bottoms, we will be more or less brief under the above heading.

The Board of Fisheries under the supervision of its inspectors planted this season 1,493,394 bushels of shell and 27,400 bushels of seed oysters on the oyster bottoms belonging to the State of South Carolina and leased to the operators. This department has given particular attention to the cultivation and conservation of our oyster bottoms and we are unquestionably producing a number one oyster both in size and flavor, in fact, we claim that the South Carolina raw oyster exceeds any other oyster produced in America as to flavor. Our bottoms today contain more oysters for canning purposes than ever before, and we believe that this

condition has been brought about through the planting of shell and seed oysters under the supervision of this Board.

The Board of Fisheries earnestly requests that the General Assembly will not deem it necessary to pass a law to reduce the amount of shell and seed oysters to be planted back on these bottoms as we feel that the cultivation of these oyster lands is necessary to obtain the high grade oyster and the quantity we are producing and without these requirements we feel that the oysters will be greatly depleted in the near future. The lessee is only paying to the State of South Carolina \$1.00 per acre per year for the use of these bottoms, in addition, of course, the law requires him to cultivate these bottoms, for if this was not done there would, in the course of time, be no production. As an example, the farmer who plants his corn and cotton crop and fails to cultivate same will be without a crop. This applies to the oysterman also.

Our reason for describing oyster culture in this report is because we are led to believe it can greatly increase our seafood resources at a time when larger food production is important and to point out certain precautions which should be observed when this method of oyster culture is employed. The method consists in planting approximately two-year old oysters in baskets or trays from 6 inches to 3 inches above the bottom in suitable shellfish areas. The oysters are bare and uncovered at low tide, and covered at high tide. In about six months they have attained a size equivalent to a five-year old oyster. A well established firm in Virginia has been employing this method successfully for five years with remarkable results. Among the factors responsible for this growth are the following: (1) The oysters are in the upper layers of the water where the temperature is relatively high and the effect of the sunlight produces a plentiful supply of microscopic food, probably of superior vitamin contents because of irradiation by sunlight. (2) The shellfish are above the mud and sand where particles of inert material do not become mixed with the food and cause rejection and waste of food. The oyster rejects what is not considered food on the basis of size particles, consequently, when oversize sand grains or mud particles get into its food the mixture is rejected and the slow process of straining food particles must be started all over again. This rejection hardly ever becomes necessary when the oyster is supported above the bottom, consequently, the amount of food

which the oyster injects is greatly increased and growth is correspondingly more rapid. (3) The oysters are protected from the natural enemies such as starfish, drum fish, and mud worms. If attacked by drills they can be readily discovered and removed at low tide. A suitable area must be selected, protected from storms, in shallow water where stringers supported on stakes or piling can be erected so that they, in turn, can support the trays or baskets. There must be freedom from navigation hazards, proper and abundant food for the oysters, and adequate safeguards from the sanitary standpoint.

SUBJECT NUMBER THREE

CRABS

The crab industry in our territory still continues to grow in leaps and bounds. The Blue Channel Corporation at Port Royall, S. C., operates a real up-to-date canning plant and in addition to the canning of crab meat they have the shells prepared for the serving of the meat by the house-wives on the table, the balance left after canning the meat is dried and ground into a meal which is used for fertilizer and chicken food. This corporation is able to sell its entire production and puts up a very high class product.

The Lupton Fish & Oyster Co., is located in Charleston, S. C. and produces a very high type product. They put out large quantities of fresh crab meat which is shipped to many states in the Union. There is a very heavy demand for their products.

Two years ago there was a bill passed by the General Assembly prohibiting the catching of crabs of less than five inches from tip to tip across the back. There is also a law prohibiting the catching of the sponge crab. The passage of these two laws has proved to be most beneficial to the crab industry of our State. Without the passage of same the crab would be depleted on a large scale and in the course of time there would be very few crabs in our waters. The Board of Fisheries has been particularly active in enforcing these laws and has made a large number of arrests and obtained many convictions for the violation of same. The operators are very much pleased with our procedure in enforcing these laws and have expressed themselves very favorably in regard to the results secured.

Crab meat is a very delicious food and large quantities have been used by the Armed Forces of this country and across the seas, as well as by our civilian population.

The operators in this industry met with many hardships, especially in not being able to obtain sufficient labor to keep their plants at a high rate of production.

The blue crab constitutes one of our major fisheries in this state at present, and it is hard to realize that this industry only started to function on a scale of any size since the year of 1937.

For successful management of the fishery, further biological information is required to provide a sound basis for conservation policies. If the General Assembly of South Carolina would provide sufficient money to obtain an expert for research studies on the crab and request that the U. S. Fish and Wildlife Service pay a portion of the cost for this work we feel that a great deal could be accomplished.

The history of the blue crab fishery, like all other seafoods, has been one of exploitation and decline followed by investigation for the purpose of setting up conservation measures for the future protection of the fishery. In the North and Middle Atlantic states' section the blue crab has already been greatly reduced in numbers and the closeness of a large market insures a heavy drain upon the supply. It is doubtful that in the entire history of the Bureau of Fisheries it was ever possible to make adequate studies of a marine fishery before serious damage had occurred. It is all the more important, therefore, that an investigation of the blue crab should be made in South Carolina before any large scale exploitation has occurred and while the natural productivity of this section can be determined. The crab season at this time extends from January to January.

Besides the two operators already mentioned we have five other operators packing fresh crab meat, and they all seem to have a demand for their entire output.

The blue crab accounts for 90% of the production of crab meat, and it is marketed very largely as fresh meat. A method was developed for canning crab meat in the United States as far back as 1878. But the pack has never been operated on a very large scale until recent years. The blue crab is much smaller than the dungeness or king crab, and the cost of picking is greater.

This industry gives employment to a large number of people, particularly to those living on the islands of South Carolina. It furnishes employment to these people when same is very much needed during normal times. It also gives employment to a number of women and minor children which makes it very essential for these communities as these women and children are not able to obtain other employment. A large proportion of the production of this industry is shipped out of the state to other markets and, consequently, brings into our state a large amount of money from other sections.

The crab appears to move in shallow water in floodtide and return to deeper water on ebb tide. Also, during the late fall and early spring it appears that the crab seeks warmer sections of water as there appears to be a positive correlation between the temperature and the catch of crabs during these periods of rapid change of water temperatures. Hibernation seems to be general at temperatures below 10-C, and the few crabs taken following cold spells are likely to yield relatively little meat, indicating a rapid loss of flesh. However, it has been observed that crabs and fishermen are about equally elusive during a cold snap; negroes having neither the clothes nor the inclination to withstand temperatures near freezing.

It is customary for crab buyers to send a truck each evening to collection points where the day's catch of one or more crabbers is weighed and picked up for transportation. It is apparent, therefore, that due to the limitations of travel by the fishermen and the necessity of returning the catch to a point on shore which can be reached by truck that a relative small percentage of the total available area is actually fished at one time. Also, the exclusive use of row boats necessarily stops all fishing during inclement weather.

In making these recommendations, the chief consideration has been to provide a sound basis whereby the fishery, without future serious depletion, may yield the maximum amount of revenue to the industry and the state, and it has been borne in mind that the industry is, and very likely always will be, largely dependent on unskilled negro labor.

SUBJECT NUMBER FOUR**SHAD**

Because the number of shad fishermen in the state has been greatly reduced by the call upon our men for the Armed Services of America, there are about twice as many shad now escaping the fishermen's nets to spawn in the rivers and coves of our state. The larger number of spawners is expected to produce a considerable increase in the abundance of our shad which is one of our choicest food fish. This increase will only be temporary if fishing for shad returns to its former intensity after the war. Therefore, I am again recommending to your honorable body, the General Assembly of South Carolina, that you enact a law requiring that shad nets be placed 400 yards apart in lieu of the present law that allows them to be placed 200 yards apart. Unquestionably, the change in this law would permit large quantities of spawning fish to get by and go into the spawning area. It would also reduce the number of fishermen operating in our waters, and in the course of time increase the number of shad.

Our catch this year was not as large as it has been due, as cited above, to lesser number of fishermen which we feel will prove of benefit to this industry in the future. The fishermen this year caught more fish per man than usual, and the price was much above average, therefore, making it very profitable to those fishermen who operated.

The fishermen need have no fear that the portion of the run allowed to escape the fishery to spawn will be a total loss to them. In fact, most of the escaped fish will return to the rivers the following year as much larger fish. If not caught shad may return many times. Some of the shad of the South Carolina waters population have spawned five or six times. With each year of added growth the fish naturally becomes more valuable to the fisherman as a market fish. The mortality of the shad at sea is low, therefore, it is important for us to protect them while they are in our waters.

The hatchery at Orangeburg, S. C. demonstrated that shad fry could be reared in ponds with varying degrees of success depending on the size of the ponds, intensity of population, the amount of natural food in the pond and whether other food was introduced. The mortality ranged from 50% for fish held two

months or less to more than 99% for fish held for six months or longer. The young shad made normal growth in the ponds. Fingerlings that were a month old were $1\frac{1}{2}$ inches long, at five months old they averaged about three inches long, the following spring the survivors were from four to five inches long.

Mortality of pond reared shad is not unduly high during the first month and the growth rate is very satisfactory.

Fingerlings $1\frac{1}{2}$ inches long are large enough to school and swim rapidly. At that time they are quite able to evade their enemies as they are at any time during their first summer, and, since the food supply in the ponds is usually insufficient to carry a large number of fingerlings for a longer time, it seems that they should be liberated at that size.

The sanctuary of the pond will have served its purpose protecting the young while they were incapable of evading their enemies. I would suggest that as many fish as possible be reared in these ponds and be placed in our rivers at the time mentioned above. Pond rearing of shad fry should not be substituted, in the conservation program, for the reduction of the fishing rate as the principal for restoring abundance to the fisheries. The pond-raised fish can never be numerous enough to supplant natural reproduction, but they can help to hasten recovery where it is already in progress as the natural result of moderate fishing intensity.

We are in hopes that after the duration of the war that the airplane facilities in our community will be so greatly increased that it will be possible to transport our shad and other seafood products to the northern markets which would be a valuable source to this industry as to the delivery of our perishable products.

The canning of shad is practically confined to the San Joaquin and Sacramento River districts in California and the Columbia River area. Very few shad are canned on the Atlantic coast as the entire supply is usually taken by the fresh fish market, and even when there is a large supply at lower prices canners can not compete with the fresh fish dealers.

Shad are canned as a byproduct to the canning of shad roe and at times when market conditions make it unprofitable to ship Pacific coast shad to fresh fish markets of the Atlantic coast. Shad are canned salmon style. The shad are scaled and scraped,

after which the head, tail, and fins are removed. A cut is made down the middle of the abdomen and the shad are eviscerated, the body cavity scraped to remove all traces of blood and membranes, and washed thoroughly. When cleaned and washed the shad are cut into can length pieces by machine.

SUBJECT NUMBER FIVE

TERRAPIN

There are five terrapin dealers operating in South Carolina. In 1933 terrapin were practically depleted. Since that time we have placed 3,000 terrapin each year in the waters of the state until this year as we found we had an oversupply of terrapin in our section. You can well see them crawling over the public highways along the seacoast.

The various fishermen engaged in penning terrapin have been greatly disappointed in the lack of demand for this most delicious product due to the inability of the dealers to sell at a profit. Both the interest and revenue is small. We cannot conceive of this condition lasting permanently and must believe that it is only a temporary condition because we are convinced that the American people have not lost their taste for the choicest of all soups, commonly referred to in the coastal area as "Cooter" soup. In addition to the delicious soup, the terrapin should be in demand as a luxurious food product, and its peculiar flavor appeals most highly to connoisseurs.

The Board of Fisheries will continue to study the terrapin situation and will do all in its power to encourage and stimulate a demand for same.

One thing is evident, and that is the natives are getting considerable good out of the terrapin for food purposes and they are consuming more and more each year.

SUBJECT NUMBER SIX

MUSSELS

The Atlantic mussels (*mytilus edulis*) is the only specimen canned in the U. S., and is also the variety used most widely in Europe. Other specimens such as (*modeolaria nigra*) are found in the same area but are not canned since they are usually small in size, differ in flavor, and more likely to be contaminated. The catch must be landed within a few hours and should only be

taken from the beds approved by the health authorities as mussels are subject to extremely rapid decomposition and are more liable to be the cause of food infections.

When mussels are brought ashore they are cleaned of any seaweed clinging to the shells and are freed from any sand by thorough washing in salt water. Any empty shell not removed in culling on board the fishing boat are discarded at this time.

The mussel industry is a recent thing in our state and we recommend that the General Assembly enact laws placing them under the same category as oysters as to sanitation inspection and revenue, as from the best information that I can obtain they are a member of the oyster family.

Research made by Dr. George M. Moore, Associate Biologist of the Virginia Fisheries Laboratory, warrants the continuation of his field studies on the mussel.

Mussels are bringing \$1.00 per bushel in the Wachpreague section where they are steamed, shucked and processed to make them give up their precious vitamin D for the cod liver oil shortage. We recommend that the legislature place a license for the gathering of mussels at \$2.50 per year.

SUBJECT NUMBER SEVEN

STURGEON

The difference between young sea sturgeon of a few pounds and an adult of one to two hundred pounds is so great that many fishermen refuse to believe they are one and the same specie of fish. The differences are, however, no more unusual than those normally taking place in the development of some other types of fish. The young salmon, for example, looks very little like their parents.

Sea sturgeon have been known for many years on both sides of the Atlantic, and similar differences between young and adults invariably occur. Sea sturgeon from the time of hatching until six or eight years old, remain in the river both summer and winter. These are the well-known "pelican" which are so often caught in shad nets. At the end of this time, when three feet long or less, these sturgeon migrate into the salt water and begin to grow much more rapidly. This explains why shad nets seldom pick up sturgeon between thirty-six and forty-two inches. After

two years of feeding in salt water the sturgeon matures and returns on a breeding migration. These adult fish are usually at least six feet long or more weighing at least eighty pounds. After maturity they return to the river only for a short period and spend the rest of the year in the ocean growing rapidly. They return to spawn for several years at least and often weigh around two hundred pounds.

The season in this State is from March 1st, through October 1st. May and June are the best months for large sturgeon.

This season there were 7,500 lbs., of sturgeon caught. There are two buyers and shippers operating, and there are 18 nets used for this industry. Our sturgeon have been gradually increasing in this territory.

SUBJECT NUMBER EIGHT

CLAMS

Clams are usually found around the low tide mark and they do not burrow deeply into the bottoms. They occur abundantly in most southern states. The most productive beds are found on the gulf coast of Florida in the vicinity of the everglades region. In the Middle Atlantic states hard clams are utilized in the canning industry only as an ingredient in the packing of Manhattan Style "Clam Chowder."

South Carolina has a very small area that produces many clams. Most of that area is situated in Georgetown and Horry counties.

We have one clam dealer located at Little River in Horry County. They shipped last year 1,100 bushels of clams besides the amount that was sold locally which would amount to considerably more than the bushels shipped.

This department is encouraging the development of this industry and sees it growing year by year. The industry adds employment for a number of people.

In the process of opening all species of clams, large amounts of liquid are extracted which contain varying amounts of soluble protein and other food materials. Clam liquid is canned by methods which are usually quite primitive although a few packers follow carefully the developed canning formula. Methods most extensively followed are to strain the liquor obtained in steaming

the clams through cheese cloth or similar material, filling into cans or bottles while still hot and sealing the containers immediately. No two packers use the same process, and some still cook in the open hot water bath believing that as the product is liquid commercial sterilizing may be obtained at 212 degrees F. This is not true as the liquid is apt to be more highly contaminated with spoilage organisms than clam meat.

SUBJECT NUMBER NINE

PROJECT IN HORRY COUNTY, LITTLE RIVER REPRODUCTION OF OYSTER BOTTOMS

This project was started in December, 1941 on bottoms in Horry County that had been depleted of oysters, but which had been producing oysters for many years in the past.

This department interested W. P. A., in going along with us in the work of reclaiming these bottoms. We found that the shell in that area had been practically removed. To obtain same on the spot being impossible, we proceeded with the project by planting thousands of bushels of seed oysters and staking hundreds of squares of brush. This was an exceedingly tedious job but with the help of W. P. A., and the people of Horry County we finally exceeded our hopes in the production of some real oyster beds which will go far towards supplying the citizens of that territory with a high class raw oyster. These bottoms have been closed, and we hope to open same for the removal of oysters during the present season. In this connection we recommend that a law be passed prohibiting the removal of these oysters from the beds—in-the-shell without the replacing of the shell back on the banks after removal.

SUBJECT NUMBER TEN

MENHADEN

For many years there has been no menhaden plant operating in South Carolina, and all of our menhaden fish are taken from our waters and carried to factories in North Carolina.

During 1944 Wallace M. Quinn, one of the youngest and most progressive of the menhaden pioneers began the construction of a menhaden plant at White Point near Charleston, S. C. Builder of the plant is W. C. Lockhart who has been with Wallace M.

Quinn for the past ten years and began the construction of menhaden plants many years ago. The White Point plant will include Rennenburg equipment consisting of three presses, two dryers and one cooker, all Rennenburg. Four boilers, 150 horse power each, will be included as well as twelve wooden tanks twelve feet square, seven feet deep for the curing of fish oil. The tank for fuel oil thirty-two feet across the bottom, twenty feet deep is also being constructed.

The Atlantic Coast Line R. R., runs within a mile of this plant. Many other buildings necessary for the operation of this plant are being constructed. Two new boats are under construction for this company and will be stationed at White Point. They are scheduled for delivery by March. The new plant will mean that another southern state has been drawn into the menhaden orbit. The South Carolina State Board of Fisheries records this development with real pride because it is another straw in the wind indicating that South Carolina is becoming part of the country in more ways than one.

According to reliable estimates, this plant and equipment will cost around \$150,000.00 and will put South Carolina in the business. This plant will produce mainly fish meal and oil.

SUBJECT NUMBER ELEVEN

SHRIMP

May I extend for myself and the State Board of Fisheries sincere best wishes to the men engaged in shrimping for a prosperous season which they so well deserve. People engaged in the shrimping business do not have an easy life. The Chairman of this Board has made trips on the trawlers on many occasions during all kinds of weather, and at times when the catch was good and again when the catch was poor, and well do I know what these men have to go through.

It seems now that shrimp is in great demand in the New England states. The brokers are exerting every effort to increase the number of accounts of reliable shrimpers for the reason that there has been a tremendous demand for more shrimp. I am looking forward to seeing in the near future some live-wire producer in the south begin producing shrimp on a big scale in one pound quick freeze cartons, shipped two dozen per case. I believe there is vast room for improvement in the merchandising of all seafoods. The evolution of selling is changing rapidly, and the fish-

eries are far behind. The modern house-wife does not want to buy sloppy looking fish in an old fashion market and then have to take the badly wrapped product and mess with a lot of bones.

The large self-service markets have changed everything. Almost everything is packed neatly, easy to pick up, attractive and usually ready to prepare and serve. If more producers would quickly freeze their products, everything from shrimp and oysters to clams for chowder in one pound packages with their own label, they could expect to build up a large number of customers, good will, and a terrific demand. The day may come when the chain drug stores will have packages of quick frozen shrimp and other seafoods in their freezers for sale to their customers. If this condition comes to pass it will certainly make the product most pleasing to the consumers and will place large quantities of shrimp and other seafoods before them at all times which should vastly increase their use.

There were 115 shrimp boats operating in South Carolina waters during this season which is a slight increase over the number of boats operating last season. These boats had to operate under many handicaps necessarily caused by war restrictions. There are twenty-two dealers who hold buyers and shippers licenses for shrimp, doing business in South Carolina.

At one time shrimp packing was one of the most important seafood canning industries of the Gulf of Mexico and the South Atlantic area of the U. S., but this industry has reduced its operations very materially recently for the reason, caused by abnormal conditions, of an enormous price and demand for shrimp which yielded more profit raw than if canned. The shrimpers have also suffered very materially from the scarcity of labor.

The shrimp boats operating in our waters are from many other states as we have a very small fleet of shrimp boats owned by South Carolinians. This industry employs a large number of people for heading, packing, catching and icing of shrimp. They purchase large supplies of groceries, spend considerable money for parts and repairs to boats. Therefore, the industry means quite a bit to our State.

We feel that there is an increase in the amount of shrimp in our waters this season, though there will not be as many caught as in normal times on account of restrictions and lack of labor. This condition has existed practically all over the Gulf coast and the Atlantic coast.

Cited by people of authority, an interesting side item concerning shrimp is the fact that it matures at two years of age as a male and during the next season it metamorphoses into a female, remaining as such for the rest of its life. These shrimp are caught on the regular grounds, often being brought up in large numbers in nets used to catch fish.

A large number of pounds were landed last year with little special effort to catch them.

Because of the shortage of shrimp during the spring season, many shrimp canners turned to crab meat, canning that product for the first time, the coordinator's office reported. Of course, this statement applies to the South Atlantic area.

The current season's shrimp pack in the Gulf area to March 27th, was 8% below that for the same period one year earlier and 29% below the five-year average according to the services of New Orleans Fishery Market News Office.

This season 39 canneries operating under the Seafood Inspection Service of the U. S. Food and Drug Administration have packed 558,461 standard cases utilizing approximately 37,452,000 lbs. of raw shrimp from July 1st, to March 27th. In the four-week period, February 28th, to March 27th, 1943, there were 1,441 standard cases packed, 18% below the 1,765 cases a similar period a year earlier.

SUBJECT NUMBER TWELVE

POLLUTION

Since it is the duty of the South Carolina State Board of Health Sanitary Engineer Department to pass on the polluted areas in South Carolina producing shellfish, and it being the responsibility of the sanitary engineers to decide which areas to be closed and to notify this department of these areas, it then becomes the duty of the South Carolina State Board of Fisheries to have these waters patrolled by the inspectors of its department and to have them make a report of their findings monthly, and this office upon receipt of these reports forwards the findings of the inspectors to the District Director of the U. S. Public Health Service, District No. 4, New Orleans, La.

Since our last report citing the polluted areas in the South Carolina waters producing shellfish, we received the following

report from the South Carolina State Board of Health condemning areas for the taking of shellfish in this State. This Board has notified our inspectors and the shellfish dealers operating in our State as to the areas condemned and has instructed them to act accordingly. If these areas were not protected the U. S. Government could and would place a ban on the shipping of all seafood products from them. The following are the condemned areas for pollution in the Daufuski section, half of the Savannah River along the South Carolina shores, Mud Creek, Wrights River and unmarked creek to Tybee Roads and New River to above Rams Horn Creek. Beaufort area, Beaufort River from black marker No. A-19 located at the mouth of Station Creek to Coosaw River including all creeks from same, Archers Creek from Battery Creek to Broad River including all creeks leading from same, from day marker No. 204 to the South Carolina state highway bridge and all creeks leading from same, Chowan Creek to be condemned from south end of small marsh island opposite the end of Cat Island. Station Creek will not be included in the area condemned. Charleston area, Cooper River from Pinopolis Dam to Charleston Harbor including all creeks leading from same, Ashley River from the A. C. L. R. R. Bridge to Charleston Harbor and all creeks leading from same, Wando River from the mouth of Horlbeck Creek to Charleston Harbor and all creeks leading from same, Intracoastal water way from approximately one mile north of Hamlin Creek to Charleston Harbor and all creeks leading from same, Gray Bay not included in the condemned areas, Charleston Harbor to the Atlantic Ocean including all creeks leading from same, Schooner Creek from the bay formed by Lighthouse Creek, Small Creek east of Schooner Creek and small creek west of Schooner Creek included in the condemned area, Elliott's Creek Out from Ashley River to Stono River all creeks included, Stono River from day marker No. 31 to wharf on John's Island to approximately one mile below Grimball's Wharf. The Georgetown area includes Winyah Bay, parts of Waccamaw River, Pee Dee and Sampit Rivers, Creeks adjacent to Pawley's Island from Pawley's Inlet to Midway Inlet are also condemned for the taking of shellfish.

The increase in pollution in our waters, no doubt, has been caused somewhat by the increase in our population, the actual causes of pollution in our area are from sewerage conditions and the disposal of waste materials from pulp mills, fertilizer fac-

tories etc., and other poisonous materials that find their way into the bays, rivers and sounds.

Pollution is found, but what is done to clear up this pollution which is causing many very valuable state-owned oyster bottoms to become worthless to the State and her citizens? In whoever the power is placed, steps should be taken immediately to clear up this situation, and if the power is in no one's hands I would suggest that the General Assembly place such power in the hands of a department and see that this work is done. It would fully justify the expenditure of the money necessary to protect the natural resources of our State.

SUBJECT NUMBER THIRTEEN

BOATS

The U. S. Armed Forces have returned to the State Board of Fisheries the two cabin cruisers they were using in the defense of our country. Our fleet of boats now consists of the following, which are used for patrol purposes and the supervision of oyster culture:

Charleston County

- 1 Cris craft runabout, 27 feet long.
- 2—140 h.p. Gray Motors.

Colleton County

- 1 Bateau, 14 feet long.
- 1—5 h.p. Johnson Motor.
- 1 Cabin cruiser, 39 feet long.
- 1—40 h.p. Lathrop engine.

Georgetown County

- 1 Cabin cruiser 27 feet long.
- 1—40 h.p. Gray engine.

Beaufort County:

- 1 Cabin Cruiser, 26 feet long.
- 1—40 h.p. Gray engine.
- 1 Thompson boat, T.V.T. c model, 14 feet long.
- 1—22 h.p. Johnson Motor.

Horry County

- 1 Sea skiff, 14 feet long.
- 1—9.8 h.p. Johnson Sea Horse Motor.
- 1—T.V.T. Thompson boat.

Clarendon County

- 1—5 h.p. Johnson Sea Horse Motor.
- 1—Bateau.

Jasper County

- 1—5 h.p. Johnson Motor.

On Storage

- 1 Thompson T.V.T. boat.
- 3—22 h.p. Johnson Motors.

SUBJECT NUMBER FOURTEEN**FISH**

Under fish, Section 3299 of the Code of Laws of South Carolina, the term fish includes shrimp, terrapin, shellfish, turtles etc., but as most of these are listed under other subjects in this report I will only take up a few of those not referred to elsewhere.

Among the most plentiful and valuable of these food fish are mullet, which are caught by the thousands of pounds in Horry and Georgetown Counties and hauled away by trucks or shipped to northern markets without any record being kept on them or impost tax paid. There should be a law passed requiring these fishermen to keep records and report their catches to this office as is done with the shad and other fish.

Schools of small mullet can frequently be seen in the river where their habit of schooling and leaping makes them easily recognizable. They are often to be seen ascending in a thin sheet of water. The muddiest waters of rivers seem to be to their liking as are their small partially cut-off lakes where the water is brackish and the temperature high. Mullet are numerous in the quiet canals and drain ditches and thrive in highly saline waters. In all they are one of the most abundant fishes.

Little is known of the life history of the mullet. In most parts of the world mullet are reported to be fall spawners in salt water. The apparent lack of large mullet during the early months of

1942 might indicate that the population at this season was composed only or largely of juveniles.

It cannot be said that the potential value of mullet either for food or sport is entirely realized. They are a well-known food fish although their flavor is not savored by all who have tried them. It is a rather common belief that they cannot be caught with hook and line, and comparatively few people angle for them.

In spite of a reduction in fishing intensity due to prevailing war-time conditions, the fishing industry in general is in a satisfactory condition. Those who have been able to continue operations have enjoyed two seasons of real prosperity, to which they were entitled after so many lean years in the past. Reports indicate a greater abundance of fish than for several years.

In 1935 the Legislature passed an Act prohibiting the killing of sea turtles or the destruction of turtle eggs which has caused the turtle to increase along our coast, and they were reported this year to be seen quite commonly along our beaches.

In 1936 there was an Act passed setting aside certain areas as sanctuaries for the propagation of marine life and prohibiting any trawling therein. We believe this law is responsible for the larger catch of fish by the sportsmen reported lately.

In 1936 an Act was also passed limiting the length of seines and other nets in Charleston County. This Act has also been beneficial to sport fishing, but has no doubt, hindered market fishing in this county as it is almost impossible to catch mullet in so short a net.

There are numerous fish industries started in the United States that have not yet been developed in this State, such as shark and other fishing of that kind. We have an abundance of shark and stingarees etc., which are being made use of elsewhere and we hope such an industry will start here shortly.

Fish is the only food left that the scientists haven't been able to get their hands on and improve. The flounder you eat today hasn't got any more vitamins in it than the flounder your great-great-granddaddy ate, and it tastes the same. Maybe so, but with filleting, quick freezing, and other improved practices in merchandising, Mr. Average Consumer certainly can obtain a far better product.

Price control on fresh fish is one of the most difficult price control problems there is. You see, so many things enter into the story behind the supply of fish. If the weather is favorable, the market may be glutted with fish. If the catch isn't good, fish are scarce in the stores. The supply available is completely unpredictable. And then, as you know, there is the factor of spoilage. In England because of these difficulties there was no control over fish prices until after they had had price control on other products for three years. And in Canada, where pricing is a year older and the problems far simpler than is in our country, the government has not yet set dollar-and-cents prices on fish in the retail stores.

SUBJECT NUMBER FIFTEEN

LAW ENFORCEMENT

The personnel, for enforcing the laws relative to commercial fishing, of this department is as follows: a Chief Inspector and ten District Inspectors. The District Inspectors are under the supervision of the Chief Inspector, and the law pertaining to same reads as follows: Code, Section 3324: "It shall be the duty of each of the assistant inspectors, under the direction of the Chief Inspector, to carry out all the provisions of the fisheries laws within his separate district, to enforce said laws and arrest for violations thereof committed within his presence anywhere in the state; to execute warrants placed in his hands for violations of the fisheries laws and generally to carry out the orders and instructions and observe the rules and regulations coming from or through the Chief Inspector or directly from the Board of Fisheries."

In addition to enforcing the commercial fishery laws it is the duty of the District Inspectors to personally supervise the planting of all seed and oyster shell and to see that the oyster bottoms of our State are cultivated under the directions of the Chief Inspector, and to patrol the polluted areas and in case violations are found to make arrests, and also to make a monthly report of their finding as to polluted areas to the Board of Fisheries.

SUBJECT NUMBER SIXTEEN**RECOMMENDATIONS**

1. We suggest that Code, Section 3343 be clarified so as to remove any doubt as to whether the planting of the required amount of shell is per acre or per lease.

2. We recommend that a law be enacted to make the license fee on shippers of raw oysters \$5.00.

3. We call your attention again to the fact that we have three oyster canners in South Carolina, and they are doing thousands of dollars of business per annum and the license fee is only \$1.00 per year for the operation of such a large business. This license charge is out of all reason and we ask that you make the license fee \$50.00 per annum to operate an oyster canning factory.

4. We, definitely, request and plead for a tax of five cents per gallon on all raw oysters shipped into South Carolina, and that a tax of two cents be placed on each 60 oz. of canned oysters shipped into the State. These are the taxes on South Carolina oysters, and it is only fair to the South Carolina producers that the law be passed in order that the tax may bear equally on all imported oysters in our State, otherwise, our native operators are doing business at a disadvantage as against those operators without the State against whom no tax is assessed which we do not think is just; the State is also deprived of revenue which in all fairness is due it.

5. We request that the General Assembly appropriate sufficient funds for the hiring of engineers for the purpose of re-surveying all oyster bottoms that are now leased.

6. We recommend that your Honorable Body enact a law making it mandatory that shad nets be placed 400 yards apart instead of the present law which permits the nets to be placed within 200 yards of each other. It would reduce the vast amount of fishing somewhat and, naturally, allow more spawning fish to escape and would cause more shad to remain in our waters.

7. We feel that the license fee charged for the swimming fish license is entirely too low. This license permits people to fish for all salt water fish, with the exception of sturgeon, and we request that the General Assembly make this license fee \$3.50 instead of \$2.50 as at present.

8. We request that the General Assembly pass an Act giving the South Carolina State Board of Fisheries authority to declare a closed season or shorten an established season for fishing in any area located in the coastal section of South Carolina, and to extend any season of any of the fisheries in the coastal section of this State when in its judgment the result of its action would prove beneficial to the State.

9. We request that the General Assembly appropriate sufficient funds for an investigation of the blue crab.

10. We recommend that the Legislature place a license for gathering mussels at \$2.50 per annum.

11. We request that a law be enacted to require the replacing of all oyster shell back on the banks of Little River in Horry County, South Carolina, that are removed from the oyster beds in this river.

12. We request of the General Assembly that they place a small tax per pound on all salt water fish offered for sale and that the fishermen be required to keep records of their catch and make monthly reports of their catch to the South Carolina State Board of Fisheries stating the kind of fish caught, such as mullet, pompano, seabass, speckled trout, etc., and showing the number of pounds caught and the amount of tax paid.

All of which is respectfully submitted,

J. M. WITSELL, Chairman
W. KENNETH SUGGS
J. F. MORRALL
J. SHEPHERD THOMPSON

Attest:

D. H. GADSDEN, Secretary
Charleston, S. C., June 30th, 1944.



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